

Thrust transmitter system

type DC02 / MDS10

with 4-20mA or 0-10V output

Application

The non-contacting displacement probe-transmitter system is a gap to dc current device that measure static distance between the probe tip and the observed target. It uses the eddy current technology. The DC02/MDS10 system is intended for shaft axial position(thrust position) measurement in centrifugal compressors, pumps and other machines that use PLC or DCS as machinery information system. This allows the operator to monitor machine trends and to alarm in case of excessive axial movement to avoid serious problems.

However the general application is any requirement for industrial, in harsh environment, accurate, non-contacting displacement measurement.

Description

One measuring system consists of MDS10 probe and the DC02 transmitter. The transmitter radio frequency oscillator generates a radio frequency signal, that is radiated through the probe into the observed surface. The transmitter detects in the return signal the strength loss for the eddy-currents generated in the observed surface and conditions the signal for linear DC 4-20mA current output proportional to the measuring range.

A two twisted pair (four wires) shielded cable provides the connection transmitter - PLC providing power supply and output signal transmission.

The probe tip is constructed of high performance plastic, impervious to oil, water and many different chemical liquids. The probe housing is made of stainless steel in different shapes (Fig.1-5). The probe cable is concentric with PTFE/FEP isolation, can be provided with steel protective armour.

The probe is connected with the transmitter by coaxial cable of total length 5m or 9m. This length corresponds to the probe integral cable or this length is composed of integral cable length and extension cable length(Fig.6).

Possible combinations of those both lengths are described in Ordering Information. The total cable length 5m or 9m is a distinguishing feature of DC02 transmitter execution what is also described in Ordering Information. The probe in execution with miniature coaxial connector is equipped with one part of the rubber protective shield. The second part of the protective shield is supplied with probe extension cable.



The connector protective shield is made of impervious to oil and high temperature rubber. The protective shield is a sealing and galvanic isolating part for miniature connector. As both parts of rubber protection shield are closed together by groove-flange method and are tightly matched to the connector body the shield is an additional protection of unwanted connector disconnecting.

The DC02 transmitter circuit is placed in aluminium enclosure(IP65) painted in RAL 7032 colour, with two cable glands. Can be mounted on a flat surface by two screws M4x16.The mounting holes spacing (52x110mm) is showed at the Fig.7. The electronics is silicon-resin encapsulated . The transmitter requires 24VDC supply voltage. The 4-20mA output signal is galvanic isolated from the supply voltage. In case of probe damage or probe disconnecting from transmitter the output current 4-20mA goes down to value less than 0,1mA.

The probes, probe extension cables and transmitters are changeable for the same total cable length.

Performances

METROLOGICAL

Measuring range: 1,5; 2,0; 2,5; 3,0; 3,5; 4,0mm

Output signal range:

4-20mA DC, $R_{load} < 500\Omega$ (including cable)

Maximum measuring error of FS (full scale):

$\pm 1,0\%$ for 1,5 to 3,0mm ranges

$\pm 1,5\%$ for 3,5mm range

$\pm 2,0\%$ for 4,0mm range

if calibrated as a system , additional $\pm 2\%$ including interchangeability error at room temperature

Temperature additional error of full scale(over rated temperature range): $\pm 3\%$

Frequency response: 0 to 5kHz

Not OK information: output signal go to less than 0,1mA after probe cable not connecting, interruption or shorting

Minimum target size in diameter: 26 mm for 2mm range, 38mm for 3mm range, 50mm for 4mm range

ELECTRICAL

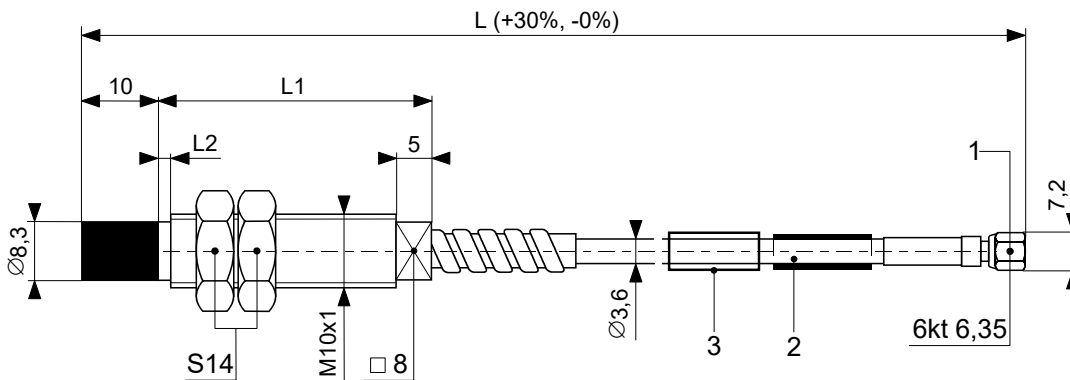
Power supply: 18 to 36 V DC
 Current consumption: < 40 mA
 Galvanic isolation DC output/ power source: 1,5kV

ENVIRONMENTAL

Operating temperature:
 Probe: -35 to +180 °C
 Transmitter: -35 to +70°C
 Relative humidity:
 Probe: to 95%, without condensation
 Transmitter: 100%, not submerged

MECHANICAL

Dimensions:
 Probe: Figures 1-5
 Extension cable: Figure 6
 Transmitter: Figure 7
 Mass(typical):
 Probe with 1m cable, without armour : 100g
 Cable: 32g/m
 Armour: 50g/m
 Transmitter: 600g
 Housing material:
 Probe: stainless steel AISI 304
 Transmitter: aluminum alloy



- 1 – Miniature female coaxial connector
- 2 – Part number and serial number
- 3 – Heat shrinkable jacket for user's designation

- Cable diameter 3,6mm , FEP isolation
- Stainless steel armour, outer diameter 7.0mm
- Stainless steel armour diameter with additional PVDF outer jacket: 7.5mm

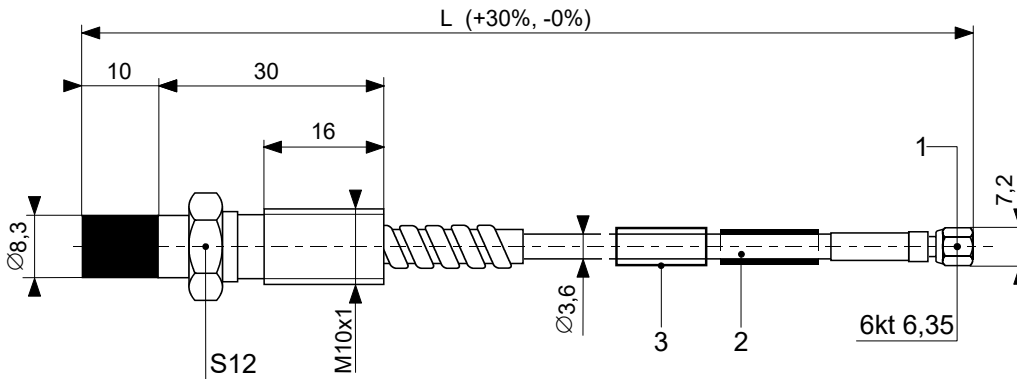
Fig.1 MDS10P - probe in basic shape

Ordering information for probe of basic shape

A B C D E
MDS10P -□□□-□□□-□□-□□-□□

Options description

- A** □□□ Overall case length L1 in mm, range from 030 to 200 with 10mm step
- B** □□□ Unthreaded length L2 in mm, range from 000, 010 and further to 160 with 10mm step
- C** □□ Total probe integral cable length L
 - 0 5** cable length 0.5m
 - 1 0** cable length 1.0m
 - 2 0** cable length 2.0m
 - 5 0** cable length 5.0m
 - 9 0** cable length 9.0m
- D** □□ Cable stainless steel armour protection
 - 0 0** without armour
 - 0 1** with armour
 - 0 2** with armour having additional PVDF outer jacket
- E** □□ Probe cable with miniature connector to connect with extension cable
 - 0 0** without connector(cable wire and screen ended with kneaded sleeves)
 - 0 1** with connector (apply to probe with L=0.5m, 1.0m, 2.0m)



- 1 – Miniature female coaxial connector
 2 – Part number and serial number
 3 – Heat shrinkable jacket for user's designation

- Cable diameter 3,6mm , FEP isolation
- Stainless steel armour, outer diameter 7.0mm
- Stainless steel armour diameter with additional PVDF outer jacket: 7.5mm

Fig.2 MDS10PO – probe shape for reverse mount.

Ordering information for probe of reverse mount shape

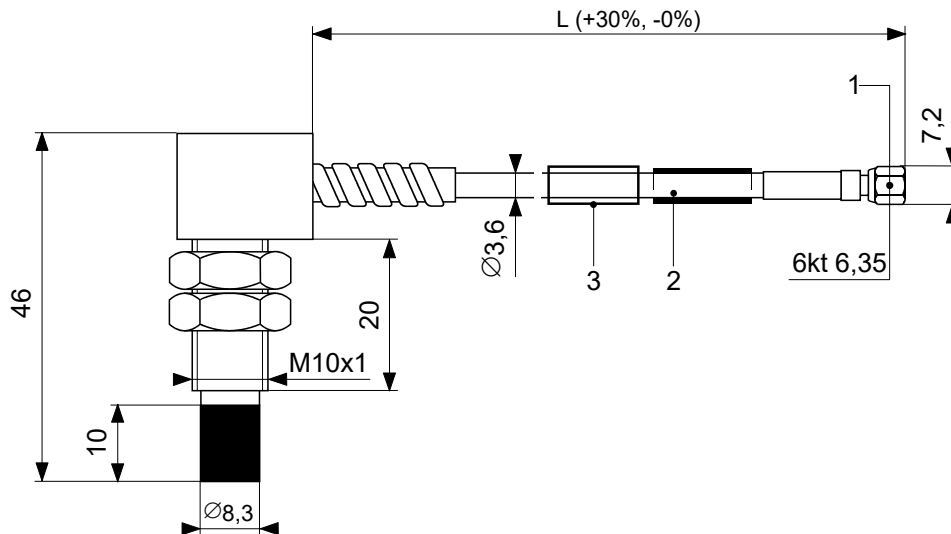
A B C

MDS10PO - □□-□□-□□

Options description

- A** □□ Total probe integral cable length L
- 05** cable length 0.5m
 - 10** cable length 1.0m
 - 20** cable length 2.0m
 - 50** cable length 5.0m
 - 90** cable length 9.0m
- B** □□ Cable stainless steel armour protection
- 00** without armour
 - 01** with armour
 - 02** with armour having additional PVDF outer jacket
- C** □□ Probe cable with miniature connector to connect with extension cable
- 00** without connector(cable wire and screen ended with kneaded sleeves)
 - 01** with connector (apply to probe with L=0.5m, 1.0m, 2.0m)





- 1 – Miniature female coaxial connector
 2 – Part number and serial number
 3 – Heat shrinkable jacket for user's designation

- Cable diameter 3,6mm , FEP isolation
- Stainless steel armor, outer diameter 7.0mm
- Stainless steel armor diameter with additional PVDF outer jacket: 7.5mm

Fig.3 MDS10K – probe shape with side exit cable

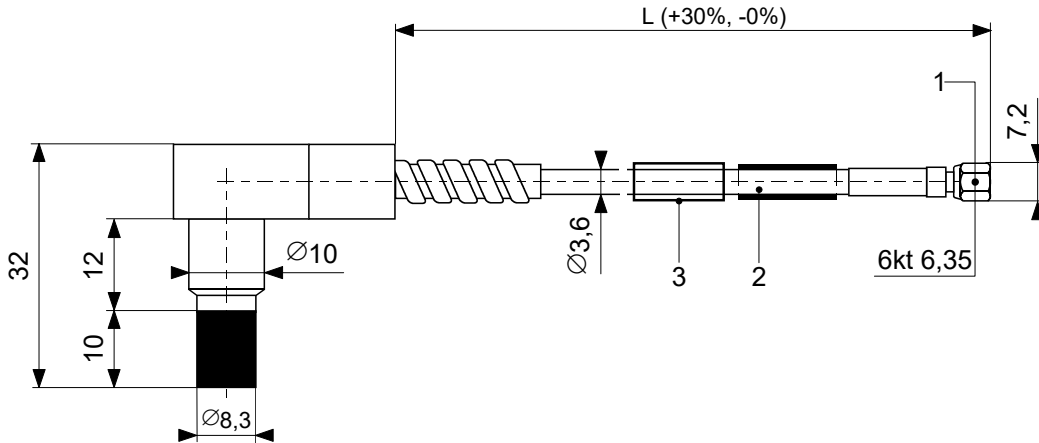
Ordering information for probe with side exit cable

A B C
MDS10K - □□-□□-□□

Options description

- A** □□ Total probe integral cable length L
 05 cable length 0.5m
 10 cable length 1.0m
 20 cable length 2.0m
 50 cable length 5.0m
 90 cable length 9.0m
- B** □□ Cable stainless steel armor protection
 00 without armor
 01 with armor
 02 with armor having additional PVDF outer jacket
- C** □□ Probe cable with miniature connector to connect with extension cable
 00 without connector(cable wire and screen ended with kneaded sleeves)
 01 with connector (apply to probe with L=0.5m, 1.0m, 2.0m)





- 1 – Miniature female coaxial connector
 2 – Part number and serial number
 3 – Heat shrinkable jacket for user's designation

- Cable diameter 3,6mm , FEP isolation
- Stainless steel armor, outer diameter 7.0mm
- Stainless steel armor diameter with additional PVDF outer jacket: 7.5mm

Fig.4 MDS10KG – probe shape with side exit cable and smooth casing

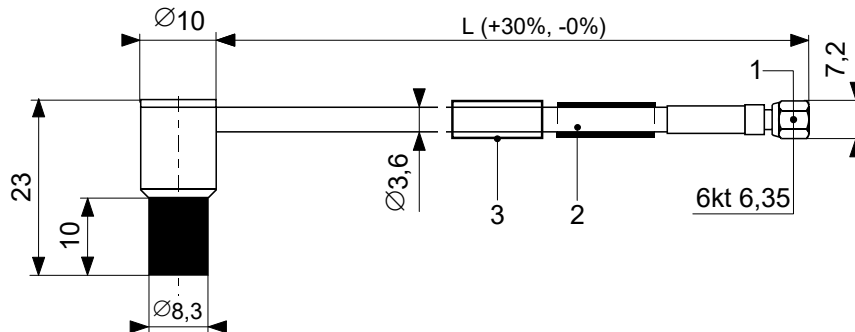
Ordering information for probe with side exit cable, smooth casing

A B C
MDS10KG - □□-□□-□□

Options description

- A** □□ Total probe integral cable length L
 05 cable length 0.5m
 10 cable length 1.0m
 20 cable length 2.0m
 50 cable length 5.0m
 90 cable length 9.0m
- B** □□ Cable stainless steel armor protection
 00 without armor
 01 with armor
 02 with armor having additional PVDF outer jacket
- C** □□ Probe cable with miniature connector to connect with extension cable
 00 without connector(cable wire and screen ended with kneaded sleeves)
 01 with connector (apply to probe with L=0.5m, 1.0m, 2.0m)





- 1 – Miniature female coaxial connector
 2 – Part number and serial number
 3 – Heat shrinkable jacket for user's designation

- cable diameter 3,6mm , FEP isolation
- MDS10M probe is not offered with stainless steel armor

Fig.5 MDS10M – probe shape with miniature size

Ordering information for probe with miniature size

A B
MDS10M - □□-□□

Options description

A □□ Total probe integral cable length L

0 5 cable length 0.5m

1 0 cable length 1.0m

2 0 cable length 2.0m

5 0 cable length 5.0m

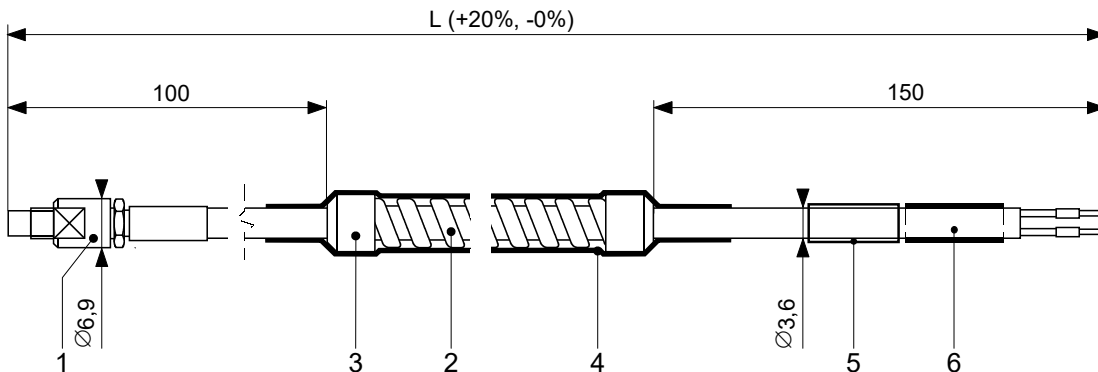
9 0 cable length 9.0m

B □□ Probe cable with miniature connector to connect with extension cable

0 0 without connector(cable wire and screen ended with kneaded sleeves)

0 1 with connector (apply to probe with L=0.5m, 1.0m, 2.0m)





- 1 – Miniature male coaxial connector
- 2 – Stainless steel armor, outer diameter 7.0mm
- 3 – Stainless steel ferrules, 8.0mm diameter
- 4 – PVDF jacket, outer diameter 7.5mm
- 5 – Heat shrinkable jacket for user's designation
- 6 – Part number and serial number

- cable diameter 3,6mm , FEP isolation
- armor length is app.300mm shorter than true extension cable length

Fig.6 MDS10C – Extension cable for MDS10... probes

Ordering information for extension cable

A B
MDS10C- □□-□□

Note: the probe cable total length (a sum of probe integral cable length and extension cable length) must equal one of two nominal total lengths: 5m or 9m

Options description

A □□ Cable length L

3 0 3.0m

4 0 4.0m

4 5 4.5m

7 0 7.0m

8 0 8.0m

8 5 8.5m

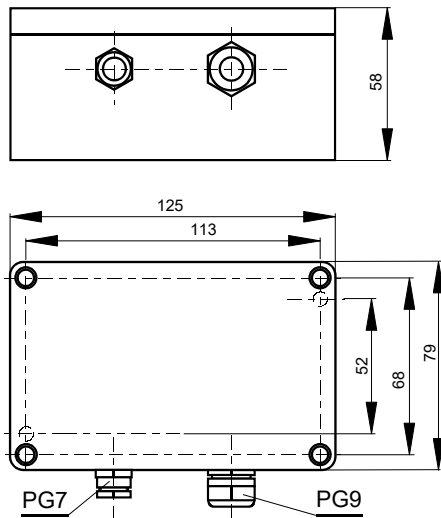
B □□ Cable stainless steel armor protection

0 0 without armor

0 1 with armor

0 2 with armor having additional PVDF outer jacket




Figure 7. DC02 Transmitter
Ordering information for DC02 Transmitter

DC 02 - **A** □ □ - **B** □ □ - **C** □ □

A □ □ Probe cable total length (a sum of probe integral cable length and extension cable length)

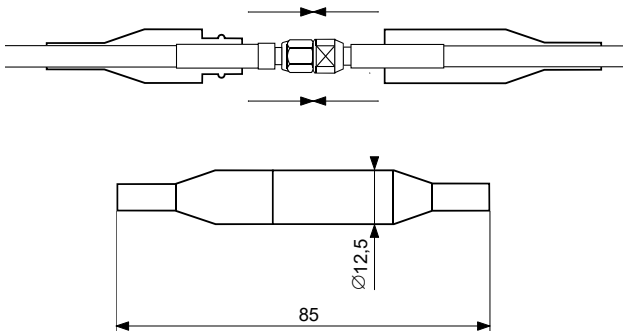
- 5 0 cable total length 5.0m
- 9 0 cable total length 9.0m

B □ □ Measuring range

- 1 5 1.5 mm range
- 2 0 2.0 mm range
- 2 5 2.5 mm range
- 3 0 3.0 mm range
- 3 5 3.5 mm range
- 4 0 4.0 mm range

C □ □ Output signal

- 0 1 4-20mA
- 0 2 0-10V


Fig.8 Connector protective shield.
Ordering information for connector protective shield

CP – rubber protective shield

Note: Probe and extension cable are supplied with protective shield.